Big Long Lake

LaGrange County

Supplemental Largemouth Bass and Bluegill Evaluation

Dates of Survey: June 24, 2008

Biologist: Neil D. Ledet, District 2 Fisheries Biologist

Objective: The objectives of this survey were to monitor the largemouth bass and bluegill populations in accordance with work plan 300FW1F10D41621.

Methods: Fish sampling consisted of one hour of pulsed D.C. nighttime electrofishing. Two dip netters were used to collect only largemouth bass and bluegill. Fish collected were measured to the nearest 0.1-inch total length (TL). Scale samples were taken for age and growth determination.

Introduction: Several fisheries surveys have been conducted at Big Long Lake since 1975. The most intensive surveys by Division of Fish and Wildlife (DFW) fisheries biologists were conducted in 2005 which consisted of a general fish community survey, an angler creel survey and a largemouth bass population estimate (Koza 2005).

The fish community survey was conducted from June 13 through 17, 2005. A total of 657 fish weighing 344 pounds were collected during this survey. Fifteen species were represented in the sample. Largemouth bass dominated the sample by number (36%) followed by bluegills (20%), yellow bullheads (14%) and yellow perch (11%).

The creel survey was conducted from April 19 through October 31, 2005. Big Long Lake anglers fished a total of 9,799 hours, with boat anglers accounting for 9,308 (95%) of those hours. Boat anglers exerted a fishing pressure of 25.5 hours per acre and harvested 10,484 fish or 1.13 fish per hour. Nine species were represented in the harvest. The number one species harvested numerically was bluegill (68%) followed by yellow perch (19%) and redear (11%). In addition to the species harvested, anglers caught and released 12,994 largemouth bass.

Bluegills were by far the most sought after fish at Big Long Lake, as 67% of all angler parties interviewed indicated they were fishing specifically for this species. An additional 5% indicated they were fishing for panfish, a group that includes bluegills. Bass fisherman comprised the second most popular category with 22%.

The total largemouth bass population estimate for Big Long Lake was 17,656 fish, or 48.4 per acre. A total of 3,729 bass, or 21% of the population, were handled during this survey. Estimates indicated a total of 14,707 (83%) stock size bass (8 in TL or larger) were present in Big Long Lake (Appendix 1). Bass 12 in TL or larger numbered 2,841 (7.8 per acre) while only 71 bass (0.2 per acre) were legal size, 14 in TL or larger.

From these surveys, it was concluded that Big Long Lake supports a good sport fish population comprised primarily of largemouth bass, bluegills, yellow perch and redear. Together these species represented 72% of the general survey sample by number and 43% by weight. Bluegills, perch and redear are providing very good fishing opportunities as approximately 78% of these three species were harvestable size. The majority of the age classes for these three species grew at an above average rate for northern Indiana natural lakes. While a plentiful largemouth bass fishery was present, the number of legal size fish was low. Largemouth bass were only moderately attractive to anglers as 22% of anglers were fishing exclusively for bass compared to 32% region wide. Despite the fact that 13,038 bass were caught by Big Long Lake anglers during the creel survey, only 20 legal size fish were kept.

Requests from Big Long Lake anglers to change bass regulations or implement other measures to reduce the bass population prompted the 2005 surveys. While the abundant, slow growing largemouth bass population could impact bluegill recruitment in the future, 2005 and historic general survey data suggests this is not occurring.

Based on a public discussion of the 2005 survey findings conducted during a 2006 Big Long Lake Association meeting, a consensus was reach not to pursue measures to reduce bass numbers at that time. The group didn't want to take any action that might negatively impact the high

quality bluegill fishery. It was also agreed the DFW biologist would periodically monitor this unique situation beginning in 2008.

Summary: During the 2008 survey, 346 largemouth bass and 63 bluegills were collected. Largemouth bass ranged in length from 5.4 in TL (age 2) to 13.8 in TL (age 6) Appendix 2. Bluegills ranged from 2.7 in TL to 9.6 in TL and represented age-1 through age-4 fish Appendix 3.

The June largemouth bass nighttime DC electrofishing catch per hour was 104 in 1984, 243 in 1993, 234 in 2005 and 346 in 2008 (Table 1). The 2008 catch rate was 3.3 times higher than the average of 105 per hour observed at six similar sized lakes in District 2. Bass 12 in TL and larger comprised 5.8% of the 2008 bass DC electrofishing sample, identical to that observed in 1984, while comprising 2.5 and 9.9 percent of the bass collected in 1993 and 2005 respectively (Table 2). No legal size bass were collected during the June 2008 or 2005 surveys compared to an average of 7.5% for similar sized lakes (Table 3).

Largemouth bass data was also evaluated using Proportional Stock Density (PSD) and Relative Stock Density (RSD) (Gabelhouse 1984). PSD is the proportion of stock length fish which are also quality length. Minimum stock length for largemouth bass is 8 in TL while the minimum quality length is 12 in TL. RSD is the proportion of stock length fish which are also a specific length. In this report, 15 in TL was used.

Since 1984, bass PSD at Big Long Lake from all gear types has ranged from 3.5 in 1993 to 7.0 in 2008 (Table 3). RSD-15 was 3.0 in 1984 and zero in all following survey years, similar to the PSD and RSD-15 that was observed from DC electrofishing surveys in 2005 and 2008 (Table 4). For a balanced fishery, Anderson (1980) suggests largemouth bass PSD and RSD-15 of 40-70 and 10-25 respectively while Murphy and Willis (1996) recommended a largemouth bass PSD of 40-70 with a RSD-15 of 10-40. The Big Long Lake bass population remains well outside of these ranges as the proportion of 8 to 12 in TL bass increases while the proportion over 12 in TL declines. Bass also grow at a rate well below average for northeast Indiana lakes and continues to decline for age-3 and age-5 fish (Table 5).

Bluegill nighttime DC electrofishing catch per hour was 135 in 1993, 32 in 2005 and 63 in 2008. The average bluegill catch observed at six similar sized lakes in District 2 was 236 per hour. Harvestable size bluegills, those 6 in TL or larger, comprised 43.7%, 93.1% and 59.7% percent of the catch during the 1984, 1993 and 2005 general surveys respectively. The percent harvestable from only nighttime DC electrofishing was 62.5% in 2005 and 75.0% in 2008, considerably higher than the 25.7% average observed at the six similar sized lakes in District 2 mentioned previously (Table 6).

As with the bass, bluegill data was also evaluated using Proportional Stock Density (PSD) and Relative Stock Density (RSD). The minimum stock length for bluegills is 3 in TL while the minimum quality length is 6 in TL. RSD for this report was 7 and 8 in TL. Bluegill PSD from the general survey catch was 46.9 in 1984, 73.6 in 1993 and 60.6 in 2005. RSD-8 was 10.4, 30.3 and 27.3 in 1984, 1993 and 2005 respectively. Bluegill PSD from the electrofishing catch in 2005 and 2008 was 62.5 and 78.7 respectively. RSD-7 and RSD -8 from electrofishing was 50.0 and 36.1 respectively in 2005 and 22.5 and 37.3 respectively in 2008. These were considerably higher than the average 29.8 PSD, 11.9 RSD-7 and 1.8 RSD-8 observed at the six similar sized lakes in District 2. Murphy and Willis also recommended a bluegill PSD of 20-60 and a RSD-8 of 5-20 for a balanced fishery. If proportional stock densities and relative stock densities are appropriate targets for complex natural lake fish communities, then the Big Long Lake bluegill population is well above this preferred range. Although age-2 and older fish bluegills grew at an above average rate, PSD and RSD values suggest that relatively few bluegills between 3.0 and 5.9 in TL were present (Table 7).

Based on June nighttime DC electrofishing catch rates, largemouth bass numbers are presently at an all time high in Big Long Lake. Although bluegill catch rates nearly doubled compared to 2005, they still remain 3.8 times lower than the average for similar sized natural lakes. In 1984 when June bass catch rates were only average, bluegill catch rates were still low, representing approximately 40% of the average rate. At that time age-1 through age-3 bluegills were growing at an average rate and older fish were growing at an above average rate.

The initial results from Pearson (1994) provided conflicting evidence on whether an experimental 14-inch minimum size limit for largemouth bass influenced bluegill abundance, size or growth in Indiana natural lakes. Lakes with the size limit contained 57% fewer 3 to 6 inch bluegills and 158% more bluegills ≥ 8 inches than lakes without the size limit. Larger bluegills in general made up a greater proportion of the bluegill population in lakes with the size limit. However, there were no significant differences in largemouth bass numbers or size in lakes with and without the size limit, and there was little correlation between largemouth bass and bluegill numbers and size. Since the implementation of a statewide 14 in TL minimum size limit in 1998, it has been well documented that bass numbers in the natural lakes have significantly increased. However, a recent region wide review of the data to determine the correlation between bass and bluegill populations has not been addressed. If the correlations observed in 1994 still hold true, then the current minimum bass size limit could be overly restrictive in lakes like Big Long which have historically produced abundant, slow growing bass populations.

Recommendations: It is recommended that nighttime DC electrofishing be conducted at Big Long in 2010 to monitor the bass and bluegill populations. Sampling will be conducted on two nights in June, one week apart as suggested by Pearson (1994). It is also recommended that the next strategic/work plan cycle include a review of post 1994 data to determine if a correlation exists between largemouth bass and bluegill abundance, size and growth in our complex natural lakes fish communities.

Literature Cited:

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Table 1. Species composition and relative abundance of fish collected during the 1975, 1984, 1993, 2005 and 2008 Big Long Lake fisheries surveys using gillnets, trap nets and electrofishing.

Species	1975	1984	1993	2005	2008
Black bullhead	12	-	-	-	
Black crappie	7	-	2	-	
Bluegill	106	103	296 (135/hr)	134 (32/hr)	63 (63/hr)
Bowfin	8	19	13	6	
Brown bullhead	37	106	28	3	
Golden shiner	2	135	6	-	
Green sunfish	17	31	6	2	
Hybrid sunfish	-	2	3	1	
Lake chubsucker	20	229	20	3	
Largemouth bass	25*	156 (104/hr)	243 (243/hr)	234 (168/hr)	346 (346/hr)
Northern pike	-	-	5	9	
Pumpkinseed	12	112	22	10	
Redear	17	29	151	29	
Redfin pickerel	5	31	3	1	
Rock bass	-	1	-	-	
Spotted gar	5	9	45	19	
Warmouth	92	98	48	44	
Yellow bullhead	75	153	28	89	
Yellow perch	25	344	225	73	
Total	465	1,558	1,144	657	
Sampling Effort					
Electrofishing Effort	1.5 hr AC	1.5 hr DC	1.0 hr DC	1.25 hr DC	1 hr DC
Gill Net Effort	9 lifts	9 lifts	12 lifts	8 lifts	
Trap Net Effort		9 lifts	12 lifts	4 lifts	

* AC electrofishing, DC electrofishing only in 2008

Table 2. Catch by select size ranges for bluegill and largemouth bass collected during 1975, 1984, 1993, 2005 and 2008 Big Long Lake fisheries surveys using gillnets, trap nets and electrofishing.

Species	Length Range (TL)	1984	1993	2005	2008
Bluegill	3.0-5.5"	51	102	52	12
	6.0-6.5"	19	34	17	14
	7.0-7.5"	16	39	27	11
	≥ 8.0"	10	116	36	22
	% Harvestable ≥ 6"	43.7	93.1	59.7	75.0
	PSD	46.9	73.6	60.6	78.7
	RSD 8"	10.4	30.0	27.3	37.3
Largemouth bass	8.0-9.5"	61	105	64	122
	10.0-11.5"	28	57	102	142
	12.0-13.5"	7	6	23	20
	14.0-17.5"	3	0	0	0
	≥ 18.0"	1	0	0	0
	% ≥ 12"	5.8	2.5	9.8	5.8
	PSD	11.0	3.5	12.2	7.0
	RSD 15"	3.0	0	0	0

DC electrofishing only in 2008

Table 3. Catch by select size ranges for bluegill and largemouth bass collected during 2005 and 2008 Big Long Lake fisheries surveys using nighttime DC electrofishing.

Species	Length Range (TL)	2005	2008
Bluegill	3.0-5.5"	15	12
	6.0-6.5"	5	14
	7.0-7.5"	11	11
	≥ 8.0"	9	22
	PSD	62.5	78.7
	RSD 8"	22.5	37.3
Largemouth	8.0-9.5"	59	122
bass	10.0-11.5"	91	142
	12.0-13.5"	20	20
	14.0-17.5"	0	0
	≥ 18.0"	0	0
	PSD	11.8	7.0
	RSD 15"	0	0

Table 4. Number, percent and size structure of largemouth bass collected from Big Long Lake by nighttime DC electrofishing.

Year	Number per hour	Percent harvestable	PSD	RSD 8-12 inches	RSD 12-14 inches	RSD 14-18 inches	RSD ≥ 18 inches
2005	168	0	11.8	88.2	11.8	0	0
2008	346	0	7.0	93.0	7.0	0	0
District 2 Average	105	7.5	32.4	67.7	23.1	7.6	1.8

Average for six District 2 natural lakes between 300 and 450 acres.

Table 5. Average length at last annulus formation for largemouth bass collected during the 1975, 1984, 1993, 2005 and 2008 fisheries surveys of Big Long Lake.

	Length (inches) at last annulus formation at each age					
Year	1	2	3	4	5	6
1975	4.4	7.4	8.6	9.9	11.1	12.3
1984	3.3	6.1	8.1	10.2	12.1	
1993	3.9	6.6	8.7	10.1	11.3	
2005	3.6	6.6	9.2	11.1	12.6	13.8
2008	3.8	6.6	8.8	11.3	12.1	
Natural lakes average	3.5	6.9	9.5	11.6	13.4	14.7

Table 6. Number, percent and size structure of bluegill collected from Big Long Lake by nighttime DC electrofishing.

Year	Number per hour	Percent harvestable	PSD	RSD 7 in	RSD 8 in
2005	135	62.5	62.5	50.0	22.5
2008	63	75.0	78.7	36.1	37.3
Average	236	25.7	29.8	11.9	1.8

Average for six District 2 natural lakes between 300 and 450 acres.

Table 7. Average length at last annulus formation for bluegill collected during the 1975, 1984, 1993, 2005 and 2008 fisheries surveys of Big Long Lake.

	Length (inches) at last annulus formation at each age					
Year	1	2	3	4	5	6
1975	2.8	4.6	6.8	7.7	8.5	
1984	1.5	2.9	4.3	6.2	7.8	
1993	1.4	2.5	4.5	6.5	7.6	
2005	1.4	2.8	5.2	7.5	8.5	9.4
2008	1.7	3.6	6.1	8.0		
Natural lakes average	1.7	3.1	4.7	6.1	6.9	7.4

Appendix 1. Average number of stock size largemouth bass per acre in medium size natural lakes (199-499 acres) in Indiana prior to and following the imposition of a 14" minimum size limit. Number of lake populations included in the average in ( ).

Size range (inches)	Average pre-size limit (21)	Average post-size limit (7)	Big Long Lake 2005
≥ 8.0 in	11.4	20.8	40.3
≥ 12.0 in	3.1	8.8	7.8
≥ 14.0 in	1.7	3.5	0.2

APPENDIX 2. AGE-LENGTH KEY FOR BIG LONG LAKE LARGEMOUTH BASS, 2008														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0														
2.5														
3.0														
3.5														
4.0														
4.5														
5.0	1	1		1										
5.5	2	2		2										
6.0	5	5		5										
6.5	27	10		27										
7.0	17	10		14	3									
7.5	10	7		9	1									
8.0	14	6		2	12									
8.5	30	9		3	27									
9.0	42	6			35	7								
9.5	36	10			32	4								
10.0	50	11			14	36								
10.5	38	9			8	17	13							
11.0	34	7				29	5							
11.5	20	10				10	8	2						
12.0	14	7				2	10	2						
12.5	4	2					2	2						
13.0	1	1					1							
13.5	1	1						1						
Total	346	114	0	63	132	105	39	7						
Mean TL				7.1	9.3	10.7	11.6	12.5						
SE				0.09	0.07	0.07	0.12	0.26						

APPENDIX 3. AGE-LENGTH KEY FOR BIG LONG LAKE BLUEGILL, 2008						
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE			
			1	2	3	4
1.0						
1.5						
2.0						
2.5	2	2	2			
3.0	2	2		2		
3.5						
4.0	1	1		1		
4.5	2	1		2		
5.0	6	4		6		
5.5	3	3		3		
6.0	9	4		2	7	
6.5	5	3			5	
7.0	5	2			5	
7.5	6	3			6	
8.0	9	5				9
8.5	6	5				6
9.0	6	2				6
9.5	1	1				1
Total	63	38	2	16	23	22
Mean TL			2.8	5.1	7.0	8.7
SE			0.00	0.22	0.13	0.10